REMARKS

This Amendment is a submission under 37 C.F.R. § 1.114 for a Request for Continued Examination (RCE).

In the Office Action, the pending claims (i.e., claims 1-53) were rejected as being obvious over various combinations of references. In particular, claims 1-5, 16, 19, 30, 35, 44 and 45 were rejected as being obvious over published U.S. patent application Pub. No. 2001/0028399 to Conley in view of U.S. Pat. 6,674,461 to Klapman. The remainder of the pending claims (i.e., claims 6-15, 17, 18, 20-29, 31-34, 36-43 and 46-53) were rejected as being obvious over Conley in view of Klapman and further in view of U.S. Pat. 6,094,198 to Shashua. Applicants traverse the rejections as follows.

Although Applicants disagree with the rejections stated in the Office Action, Applicants have amended the independent claims of the application to clarify the claimed inventions. For example, claim 1 has been amended to clarify that the process includes the step of "capturing images with the camera systems." Claim 1 has also been amended to clarify that the method includes "applying a 2D projective image transformation to certain capture images from the camera systems to superimpose a secondary induced motion on the gross trajectory..." The other independent claims (claims 16, 30 and 44) have been amended in a similar fashion.[1]

For video applications such as advertising, sports and entertainment, it is often desirable to take a set of images of an object from a large number of cameras that surround the object, and then play back those images in sequence to create an effect as if one is flying around the object. This special effect is sometimes referred to as the "fly-around" effect. A subset of the fly-around

[1] Also, dependent claims 5, 19, 35 and 45 have been canceled, and claims directly depending from these canceled claims have been amended to depend from other claims.

effect is when the displayed images are all from the same instant in time; this is sometimes referred to as the "3D stop-motion" effect. If the cameras are positioned in a closed-ended configuration, such as a circle or ellipse, the effect is sometimes referred to as the "spin-image" effect. The process of taking images for this purpose is tedious and costly. First, all cameras must be aligned with great precision so that their central viewing rays pass through the same POI on the object. Otherwise, the set of images when played back will appear bumpy and jittery. In addition, after the set of images are taken, one may want to alter the POI around which to create the fly-around effect. This typically involves reorienting the cameras and retaking a whole new set of images. These two difficulties are compounded when dealing with an unsupervised moving object or a dynamic scene (rather than an actor following instructions). There may not be time to align all of the cameras to satisfy the condition that all central rays intersect at the POI, and the object motion may not occur again in the same place. It may also not be possible to align some of the cameras with the POI due to constraints on their allowed motions.

The claimed inventions are capable of overcoming these drawbacks. By applying 2D projective transformations to some of the captured images, misalignment errors between multiple cameras can be corrected so that so that they appear to fixate precisely on a given point of interest (POI) in the video sequence, even though they did not all point at a single 3D point in the scene. Also, new points of interest may be chosen for camera fixation, even though they were not anticipated during recording of the event.

The secondary induced motion is induced by applying 2D projective image transformations to the captured images from the camera systems that requires no knowledge of the 3D scene structure. The 2D projective transformations may be represented as a 2D homography, i.e., a 3 x 3 transformation matrix in homogenous 2D film plane coordinates. In

some cases the homography reduces either exactly or approximately to simpler image plane transforms such as similarity transformation (translation, rotation and scale), translation only, and scale only.

As an additional feature, additional frames can be generated between actual image frames from a sparse set of cameras along the gross trajectory, thereby transforming a jumpy video sequence into one that appears to be smooth and continuous. This feature is not explicitly recited in the independent claims, but is recited in dependent claims 12, 13, 28, 29, 33, 34, 52 and 53, for example.

In Conley, the primary reference relied upon by the Office, fixed cameras are painstakingly situated prior to the event of interest to avoid (or minimize) misalignment errors, although such errors inevitably occur. *See* Conley, ¶ [0026] to [0029]. Conley fails to disclose or suggest applying a 2D projective transformation to captured images to superimpose a secondary induced motion on the trajectory of the cameras.

The Office Action states that Conley shows this step at ¶ [0065], but the Office is mistaken. The morphing of image points described at paragraph [0065] of Conley is very different from the step of 2D projective image transformation recited in the pending claims. In this passage, Conley is describing the concept of using morphing to create, in effect, images from a virtual camera that would be situated between two existing cameras. The image content from the two existing cameras is changed (morphed) to create the virtual images of a virtual camera that would be in between the two existing cameras so that the impression of a rotating point-of-view can be achieved. In contrast, in the invention of claim 1, the captured images are merely 2D projective transformed (e.g., rotated or x-y translated) so that the point of interest is at the same position in each image. The content of the captured images is not affected. In Conley, the

exact opposite happens -- the cameras have to be painstakingly prearranged to minimize misalignment errors. *See* Conley, ¶ [0026] to [0029]. In fact, the teaching of ¶ [0065] of Conley about image morphing is more akin to the steps recited in dependent claims 12, 13, 28, 29, 33, 34, 52 and 53 of the application about generating additional frames between actual image frames from a sparse set of cameras along the gross trajectory. This teaching is not relevant to the step of applying a 2D projective transformation to images captured by the camera systems.

Klapman and Shashua, the other references cited in the Office Action, also fail to disclose the step of applying a 2D projective transformation to images captured by the camera systems. Therefore, the cited references fail to teach or suggest all of the limitations of the independent claims. Therefore, the pending claims are not obvious in view of the cited references. *See* MPEP § 2142 (stating that one of the prima facie elements of obviousness is that the cited references must teach or suggest all of the claim limitations).

CONCLUSION

In view of the above, Applicants respectfully request withdrawal of the rejections and allowance of the claims. If the Examiner is of the opinion that the instant application is in condition for disposition other than allowance, the Examiner is respectfully requested to the

undersigned attorney at the telephone number listed below in order that the Examiner's concerns may be expeditiously addressed.

Respectfully submitted,

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